



Cursusomvang (nominale waarden; effectieve waarden kunnen verschillen per opleiding)

Studiepunten 6.0      Studietijd 180 u      Contacturen 60.0 u

Aanbodssessies en werkvormen in academiejaar 2018-2019

A (semester 1)	Engels	werkcollege: geleide oefeningen	5.0 u
		werkcollege: PC-klasoefeningen	10.0 u
		project	15.0 u
		hoorcollege	30.0 u

Lesgevers in academiejaar 2018-2019

Saeys, Yvan

WE02      Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2018-2019

	stptn	aanbodssessie
<a href="#">Master of Science in de informatica</a>	6	A
<a href="#">Master of Science in de wiskunde</a>	6	A
<a href="#">Uitwisselingsprogramma informatica (niveau master)</a>	6	A
<a href="#">Uitwisselingsprogramma wiskunde (niveau master)</a>	6	A

Onderwijstalen

Engels

Trefwoorden

Machine learning, supervised learning (classification and regression), unsupervised learning (clustering), dimensionality reduction

Situering

Machine learning techniques present a class of widely applicable models that can be used to learn models automatically from data. In our current data-drive society, these techniques are a crucial asset of the modern data scientist that needs to decide which type of technique to use in which situation.

Inhoud

- Types of machine learning models
- The bias-variance tradeoff
- Performance evaluation (such as cross-validation, area under ROC curve)
- Supervised learning
  - Fisher LDA
  - Support Vector machines
  - Neural networks and deep learning
  - Probabilistic models
  - K-Nearest Neighbours
- Unsupervised learning
  - Hierarchical clustering
  - K-Means
  - Density based clustering
  - Self-Organizing maps
  - Gaussian mixture models and EM
- Bayesian networks and Hidden Markov models
- Semi-supervised learning
- Dimensionality reduction techniques
  - The problem of overfitting, the curse of dimensionality
  - Feature selection

- Feature transformation
- Applications of Machine Learning

#### Begincompetenties

A good knowledge of data structures and algorithms, basic statistics and probability theory and programming skills.

#### Eindcompetenties

- 1 Explain the differences among the three main styles of learning: supervised, reinforcement, and unsupervised. [Familiarity]
- 2 Implement simple algorithms for supervised learning, reinforcement learning, and unsupervised learning. [Usage]
- 3 Determine which of the three learning styles is appropriate to a particular problem domain. [Usage]
- 4 Compare and contrast each of the following techniques, providing examples of when each strategy is superior: decision trees, neural networks, and belief networks. [Assessment]
- 5 Evaluate the performance of a simple learning system on a real-world dataset. [Assessment]
- 6 Characterize the state of the art in learning theory, including its achievements and its shortcomings. [Familiarity]
- 7 Explain the problem of overfitting, along with techniques for detecting and managing the problem. [Usage]

#### Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

#### Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

#### Didactische werkvormen

Hoorcollege, project, werkcollege: geleide oefeningen, werkcollege: PC-klasoefeningen

#### Leermateriaal

Course slides, tutorials and papers are made available through Minerva.

#### Referenties

Pattern Classification, 2nd Edition Richard O. Duda, Peter E. Hart, David G. Stork  
 ISBN: 978-0-471-05669-0  
 The Elements of Statistical Learning: Data Mining, Inference and Prediction (2nd edition)  
 Trevor Hastie, Robert Tibshirani and Jerome Friedman

#### Vakinhoudelijke studiebegeleiding

Personal contact with the lecturer, through e-mail or by appointment.

#### Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

#### Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen met open vragen

#### Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen met open vragen

#### Evaluatievormen bij niet-periodegebonden evaluatie

Mondeling examen, vaardigheidstest, verslag

#### Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is mogelijk

#### Eindscoreberekening

Niet-periodegebonden evaluatie: groepswork (project) (40%) + periodegebonden: examen (60%). Om te kunnen slagen voor het opleidingsonderdeel moet een student minstens 10/20 behalen voor de niet-periodegebonden evaluatie. Is aan deze voorwaarde niet voldaan, dan kan een student niet meer dan 8/20 halen voor dit vak.